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# Buttock pressure management of able-bodied people seated on a rigid surface for two hours

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## Introduction

It is now well known that deep pressure ulcers are due to excessive pressure intensity (leading to soft tissues internal strains above 50 % for some minutes) and prolonged compression (leading to internal strains above 20 % for about two hours) [1]. Paraplegic people particularly suffer from pressure ulcers in the buttock area because of the inactivity of their leg muscles that make them a lot thinner and fragile [2] and because of the sensory dysfunctions that unable them to perceive warning signals thus keeping a risky situation by not moving enough. This paper aims at better understanding why able-bodied individuals put in quite extreme conditions (i.e seated for 2 hours long on a rigid surface) do not get pressure ulcers.

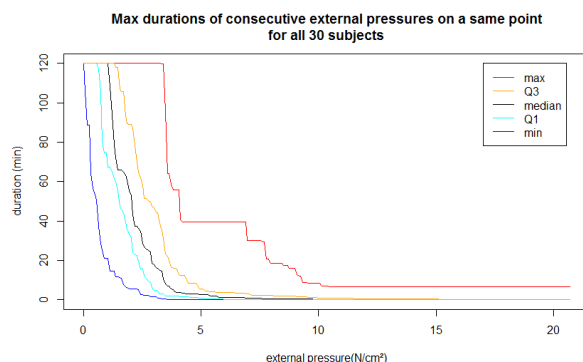
## Methods

Thirty young healthy subjects agreed to stay seated on a rigid surface during two hours while watching a movie. The buttocks/seat interface pressures were recorded at 10 Hz by a Vista Medical pressure mapping system (Orthotest). Subjects were asked to move (e.g. change their postures, release high pressures, ...) only if necessary. The study was conducted by the CIC-IT and CIC at the Grenoble University Hospital and was approved by an ethics committee (CPP Sud-Est).

## Results

The first results focus on the global bi-dimensional Pressure x Time curves.

Figure 1 shows, for different levels of pressure, the maximum durations they were hold.



**Fig. 1:** For a given level of pressure (x axis), the curve indicates the longest time one region of the buttock

*maintains that pressure (y axis). Black (resp. blue, cyan, orange, red) plot is the median (resp. min, 1<sup>st</sup> quartile, 3<sup>rd</sup> quartile, max) of data computed for the whole 30 subjects.*

## Discussion

The experiment presented here aimed at observing the behaviors of young able-bodied subjects seated on a rigid surface for a duration of 2 hours, theoretically sufficient to cause pressure ulcers [1].

Figure 1 shows a very thin interquartile range, indicating that most of the subjects seem to have similar tissue tolerance. To compare this result with the thresholds found by Loerakker et al. [1], internal stresses and strains should be used instead of external pressures. Such a computation of internal stress and strain from external pressure is possible [3] but needs the elaboration of a person-specific biomechanical model based on medical imaging exams.

## Clinical relevance

This study aims at understanding the prevention strategies of able-bodied people and estimating the dangerous thresholds of Pressure among Time.

## Acknowledgements

We appreciate the help of the staff of the CIC, the CIC-IT, and we would like to thank the volunteers.

## Conflict of Interest

Some authors are involved with the TexiSense Company ([http://www.texisense.com/home\\_en](http://www.texisense.com/home_en)).

## References

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